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THE FOOD PLANTS OF THE ANCIENT HAWAIIANS

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A SURVEY of the dietary of any people affords an interesting commentary on their natural environment, on their racial peculiarities and on the relative complexity of their civilization. This statement is peculiarly applicable to the native peoples of Polynesia, because of their erstwhile isolation and because of the strongly defined influences of their tiny island worlds.

A consideration of ancient Hawaiian life clearly outlines two features of their diet that are equally characteristic of many Polynesian peoples. First, the limited supply of meat, and, second, the culture of a considerable variety of food plants. The larger meat-producing animals were unknown to the Hawaiian until the coming of the white man. Swine, dogs and fowl comprised his domesticated animals. There were no wild mammals; the chiefs hunted mice with bow and arrow, for sport, not for meat! In certain localities and at certain seasons fish and other marine animals were obtainable in large quantities, but these did not constitute any very considerable proportion of the diet of the people as a whole. Under the rigorous *tabu* system, many forms of meat were entirely prohibited from the women; and many others were the sole right of the chiefs. The mass of the Hawaiians were enforced vegetarians, as are the mass of people in other parts of the world to-day.

The more important food plants were brought by the Hawaiians in their migrations from the South Pacific. The few indigenous fruits were utilized to a limited extent. The majority of the crop plants were raised in plantations near the villages; some, like the *awa* and *api'i,* were grown in clearings in the forest, and were visited only occasionally.

The *taro* or *kalo* (*Colocasia antiquorum* var. *esculentum* Schott.) easily takes first place in order of importance. This widely-cultivated aroid and its immediate relatives are abundant in many parts of the tropics. Throughout the larger islands of Polynesia, it is still the food plant *par excellence.* It has a crown of caladium-like leaves, borne on the summit of an erect subterranean corm. The starchy corm attains a diameter of six or seven inches, and a length of one to three feet.

There are two main classes of *taro*—the "dry-land" type, which grows without irrigation, and the "wet-land" type, which is raised in irrigated patches or *loi.* The former predominated on the uplands; the latter was most abundant on the valley-floors and lowlands. The ancient Hawaiian recognized over two hundred varieties of *taro,* which they designated by distinct varietal names. The choicer kinds were raised chiefly for the nobility, and were often spoken of as "royal" *taro.* Other kinds were used medicinally and in religious ceremonies.

The *taro* corm required about a year for maturity. It was then dug, cleaned, steam-cooked in the underground oven (*imu*), peeled and pounded into a starchy paste, *pai-ai.* In this form it kept indefinitely, and was prepared for immediate use by merely thinning with water. This constituted the familiar *poi* of Hawaii, Samoa and other Pacific Islands. It fermented slightly, and kept some time without spoiling. It was stored in wooden bowls and was eaten with the finger. Large quantities were consumed at each meal, and its starchiness was decidedly conducive to corpulency.

The succulent young leaves and petioles of the *taro* were cooked and eaten like spinach, and comprised the delicate vegetable called *lua'u.* The general use of *lua'u* at feasts caused the feasts themselves to become known as *lua'us.* The *taro* corm was also eaten as a baked or roasted vegetable, and was often mixed with breadfruit, cocoanut, sweet potatoes, and other foods. It was never eaten raw, because of the irritating poisons which were only dispelled by cooking.

Closely resembling the *taro* is the *api'i* or Giant Taro (*Alocasia macrorrhiza* Schott.). This is a large, succulent perennial, several times larger than the *taro.* The thick, erect stem rises two or three feet from the ground, and bears a large terminal crown of sagittate leaves. The *api'i* is abundant in the lower woodlands and near settlements. It occurs in many islands of the South Pacific and was probably brought to Hawaii by the first native immigrants. Unlike the *taro,* its cultivation was not carried on in any methodical manner. Small patches were planted here and there in wet places in the forest. Wooded streamways and the neighborhood of waterfalls are typical habitats for the shade-loving *api'i.* If the supply of *taro* ran short, or if there were any other shortage of food, the natives gathered, cooked and ate the coarse, starchy *api'i* stems. It was baked or roasted, and sometimes made into *poi.* Nowadays this plant is rarely used for food, but is planted for its ornamental foliage.

In quantitative importance as a food staple in ancient Hawaii the sweet potato or *u-ala* (*Ipomoea Batatas* Lam.) is exceeded only by the *taro.* The sweet potato permitted a much wider range of planting, as regards both soil and water supply, than did the *taro.* It flourished in semi-arid regions, and in the districts sheeted with lava flows. It was thus the main reliance of the natives in those regions where the *taro* did not thrive. The *u-ala* was brought from the South Seas by the Hawaiians, and was widely planted in the new island home. The natives had names for about sixty varieties and sub-varieties. Parts of Kauai and Niihau, for example, were famous in the days of early European exploration of the Pacific, as provisionary places for sweet potatoes and yams. Great quantities of *u-ala* were shipped to California during the days of "'49."

True arrowroot, *pia* (*Tacca pinnatifida* Forst.), has a wide distribution throughout the tropics, and is cultivated for its starchy tubers in many parts of the Pacific. It has accompanied the Polynesian in all his wanderings, and, like many Hawaiian food plants, finds its northern Oceanic limit in this archipelago. The *pia* leaves are radical, and rise on slender petioles to a height of several feet. The blade is five-lobed; the lobes are irregularly pinnatifid. The leaves appear in early spring and wither by the close of summer.

The ancient Hawaiians raised *pia* in small patches in the open woodlands and in various suitable lowland localities. In modern times its culture has been almost wholly abandoned, and arrowroot is now relatively rare. It does not appear to have become as thoroughly established as some of the other food plants, the *taro* and *hoi,* for example.

Another plant of wide geographic range is the yam or *hoi* (*Dioscorea sativa* L.), which occurs from Africa to Hawaii. This vigorous climber has a large tuberous rhizome, a long twining stem, and large cordate leaves. Greenish round tubers commonly occur in the leaf-axils. Both rhizome and aerial tubers (called *ala-ala*) were used for food. The *hoi* was formerly very common in the lower forest, and is still plentiful in many places. As indicated with the sweet potato, yam culture was greatly stimulated by the native trade with European vessels. "Yam Bay" on Niihau, for example, was a familiar entry in the log of many an exploring ship and whaling vessel in the early days of Pacific exploitation.

The native banana, *maia* (*Musa sapientum* L.), like the *taro* and sweet potato, is seedless, and is propagated solely by vegetative methods. It was undoubtedly introduced by the first Hawaiians, and is often referred to in their ancient songs and legends. In former times the *maia* was plentiful around the villages and plantations, and, like *api'i,* was also under semi-cultivation in the forest. These forest plantings gradually extended themselves, so that to-day there are many beautiful ravines and valley-floors covered with luxuriant wild banana groves. A considerable number of the native varieties were of the starchy or "cooking" type, that is, they required heating to bring out their characteristic delicious flavor. These are not to be confused with the so-called "plantains" of other tropical countries, which are much larger and coarser than the Hawaiian bananas. The natives were very fond of the banana, and it figured prominently in their feasts. In recent years the native varieties, of which there were about fifty, have been supplanted in the markets by various introduced kinds, the dwarf Chinese banana being chief of these and now dominating the markets.

In addition to the herbaceous starch-producing plants, already described, the Hawaiians cultivated two important trees for their starchy fruits, namely breadfruit and pandanus. The breadfruit, *ulu* (*Artocarpus incisa* L.), is one of the finest trees in the Pacific. In favorable humid situations it develops a magnificent dome of large, dark green, glossy foliage. It sometimes attains a height of seventy or eighty feet, although in Hawaii it does not reach the stature of the South Sea breadfruits.

The mature fruit is nearly as large as a man's head, and comprises a leathery reticulate rind, a small stringy central core, and a large mass of starchy edible material. Upon thorough baking the interior becomes soft and mushy, and develops a pleasant taste and odor. The Hawaiians brought the breadfruit from the South Seas, and planted it extensively on the lowlands and in the valleys. The fruit is seedless, and the tree is propagated exclusively, and with considerable difficulty, by root-cuttings.

At the time of the discovery of Hawaii by Europeans there were splendid groves of *ulu* on all the islands. Like the cocoa-palm groves, the majority have vanished with the vanishing Hawaiian. Here and there in the deserted valleys, the traveler to-day finds dishevelled breadfruit trees, surrounded by foreign vegetation—lone symbols of the passing *kanaka*.

A tree that is of much importance as a food plant on many of the low coral islands of the South Pacific is the pandanus or screw pine (*Pandanus odoratissimus* L.). The Hawaiians, having other more satisfactory starch plants, such as the *taro* and yam, did not utilize the edible *hala* drupes as freely as did their southern relatives. The sweet fragrant meat of the kernel was considered a relish, a dessert, rather than a staple of diet. The rich scarlet or orange woody ends of the drupes were artistically strung into fragrant garlands. In Hawaii the long, fibrous, ribbon-like leaves constituted the most important part of the *hala* tree, as they were universally woven into mattings. The *hala* came from Samoa and is often referred to in the old chants. It is now thoroughly naturalized and abundant in many parts of the islands, and along certain coasts forms continuous groves.

The most casual suggestion of Pacific islands brings to the traveler's mind a vivid picture of blue sky and sea, a long strip of surf and coral beach, and friendly beckoning cocoa-palms. Hawaii is the northern Oceanic limit of the cocoa-palm, that most widely-known and useful member of an immense plant family. Like the breadfruit, the Hawaiian cocoa-palm, *niu,* does not reach the luxuriant growth that characterizes the more tropical portion of its range. However, it commanded a position of great importance in the economy and lore of the ancient Hawaiian. Extensive groves were maintained by the chiefs at numerous lowland and seaside settlements. A village near Honolulu was called Niu, because of the great grove there. The village, and nearly all the grove have disappeared, but the name still remains. With the decline of the native population, many of the ancient groves fell into decay. In recent years there have been several commercial plantings; these newer plantations are restoring to Hawaii one of the distinctive features of its Polynesian charm.

The Hawaiians, like the people of all regions where the cocoa-palm thrives, utilized it in many ways—the nuts for food, oil, cups and coir; the leaves for thatch; and the wood for various minor purposes. A delicious brown pudding, *kulolo,* was made of grated cocoanut meat, mixed with grated *taro* or breadfruit. This was wrapped in *ti* leaves and baked. Sometimes the grated meat was mixed with bananas, or was flavored with shrimps. The sweet cool "milk" of the young nuts has been used since the earliest times as a unique and refreshing beverage.

The indigenous palms of Hawaii belong to the genus *Pritchardia* and were called *loulu.* The unripe fruits of several species were used as food, the kernels (*howane*) being esteemed as a delicacy. Fans and hats were plaited from young, unexpanded leaves. The *loulu* palms grew wild in the mountains, and were not generally cultivated, although occasionally a few would be planted near the villages.

Every native settlement, at the time of the coming of the first white men, had its plantations of sugar cane. Its Hawaiian name *ko* is used by other Polynesian tribes. Like all mankind, savage and civilized, the natives were very fond of sugar. They possessed no means of extracting the sugar, save the natural method of chewing the stalk. Sugar cane, like many of the crop plants, is practically seedless, and is propagated exclusively by stem cuttings. The natives cultivated about fifteen varieties, which were distinguished chiefly by the size and markings of the stem, and by the time required for maturity.

The most conspicuous shrub on the valley slopes and in the lower forests of Hawaii is the *ti* or *ki* (*Cordyline terminalis* Kth.). Its erect woody stem, six to fifteen feet high, is simple or sparingly branched, and is terminated by a cluster of large oval leaves. These are one to two feet long, bright green, smooth and papery. The large, tuberous saccharine root was the part used for food. This was dug, cleaned, cut into suitable pieces, and baked like the breadfruit. The cooking enhanced the rich sugary flavor, and made *ti*-root a toothsome delicacy. A mild beer was also fermented from the root, but this did not seem to be general in ancient Hawaii. The strong *ti* spirits of modern times were first made by some Botany Bay convicts, who taught the natives the pernicious craft of distillery.

The representative alcoholic beverage of Polynesia is *awa* (also called *awa-awa* or *kawa-kawa*), or *Piper methysticum.* The ceremonies of preparing and drinking *awa* were complex and ritualistic. The use of *awa* was largely under the control of the nobility; intoxication in early Hawaii was a prerogative of chieftainship. The *awa* plant is an erect shrub, several feet high; the smooth fleshy stems arise from a thick, spongy rhizome. This underground portion is the *awa* "root" of native trade, which was used for making the beverage. The Hawaiians raised the *awa* plant in small clearings in the lower forest, in much the same manner as *api'i* and *wauke* were grown. They distinguished a number of varieties, mainly by the color of the stem.

One of the most beautiful trees of Hawaiian valley-floors and streamways is the mountain apple, or *ohia ai* (*Jambosa malaccensis* (Linn.) D.C.). It is twenty to thirty feet high, with shining dark green leaves, and a profusion of bright red blossoms scattered along the twigs and branches. These showy flowers give place to equally attractive red "apples." The fruit is about two inches long, obovate, and has a cool, slightly saccharine flavor. This beautiful fruit tree is cosmopolitan in range, and is widely distributed over the Pacific islands. It was introduced by the early Hawaiian, and now forms extensive pure stands in many windward valleys. From the sacred wood of *ohia ai* were hewn many of the ancient idols, and its name is prominent in Polynesian legends.

The Hawaiian huckleberry, *ohelo* (*Vaccinium reticulatum* Smith), is as distinctive of the uplands and mountain ridges as the mountain apple is of the valleys. It was very abundant around the volcano Kilauea, and in the long eras of the *tabu* system was famous as a propitiatory offering to savage Pele, goddess of the crater. The shining red and amber berries have a pleasant sub-acid flavor, and are now used for making jams, pies, etc. In old Hawaii they were used solely as fresh fruit, and their attractive appearance and flavor are often referred to in the ancient songs.

This presentation of the crop plants of ancient Hawaii would be seriously incomplete if some mention were not made of the extensive utilization of sea weeds, *limu*. The Hawaiian villages were almost invariably situated on or near the seashore, and the products of the sea, both animal and vegetable, constituted an important part of the native diet. The Hawaiians were intimately familiar with many species and varieties of marine algæ. Some were collected as flotsam along the beaches; others were secured only at considerable hazard in the deeper waters of the outer reef. Some kinds were highly precinctive, others were plentiful only at certain brief seasons. The algæ were carefully sorted, cleaned, and prepared in various ways as "salads" or relishes.

It is evident that the old-time Hawaiian had a considerable range of crop plants. His crops grew all the year round. He harvested in every month. He knew his plants with microscopic detail, and in his accurate varietal designations recognized the most trivial differences. He was a good farmer, and under his own civilization in times of peace there were few famines and little hunger.